

## COMBINED ANTICALCULUS AND ANTIPLAQUE COMPOSITIONS

### TECHNICAL FIELD

The present invention relates to oral care compositions such as dentifrices, mouthwashes, lozenges, chewing gums, and the like, which are designed to prevent the accumulation of calculus, or "tartar", as it is sometimes called, on teeth, while concurrently preventing plaque.

### BACKGROUND OF THE INVENTION

Dental calculus is a deposit which forms on the surfaces of the teeth at the gingival margin. Supragingival calculus appears principally in the areas near the orifices of the salivary ducts; e.g., on the lingual surfaces of the lower anterior teeth, on the buccal surfaces of the upper first and second molars, and on the distal surfaces of the posterior molars.

Mature calculus consists of an inorganic material which is largely calcium phosphate arranged in a hydroxyapatite crystal lattice structure similar to bone, enamel and dentin. An organic portion is also present and consists of desquamated epithelial cells, leukocytes, salivary sediment, food debris and various types of microorganisms.

As the mature calculus develops, it becomes visibly white or yellowish in color unless stained or discolored by some extraneous agent. In addition to being unsightly and undesirable from an aesthetic standpoint, the mature calculus deposits are constant sources of irritation of the gingiva.

A wide variety of chemical and biological agents have been suggested in the art to retard calculus formation or to remove calculus after it is formed. Mechanical removal of this material periodically by the dentist is, of course, routine dental office procedure.

The chemical approach to calculus inhibition generally involves chelation of calcium ion and/or crystal growth inhibition which prevents the calculus from forming and/or breaks down mature calculus by removing calcium.

Dental plaque is a combination of minerals and bacteria. The bacteria associated with plaque can cause inflammatory gingivitis. Gingivitis, in turn, may lead to periodontitis, and, ultimately, tooth loss. Therefore, it would be highly desirable to develop compositions and methods for inhibiting plaque.

Since plaque can develop and adhere most easily at relatively irregular surfaces, such as those afforded by calculus, it would be of particular advantage to concurrently attack both the calculus and the plaque problems. The extensive literature in this area bespeaks the ongoing attempts of scientists and dentists to address the dual problems of dental calculus and dental plaque.

It is an object of the present invention to provide combined calculus and plaque control. The present invention employs novel combinations of anti-calculus and anti-plaque ingredients which concurrently afford the desired benefits.

### BACKGROUND ART

**PLAQUE:** Numerous compositions and methods for inhibiting the formation of plaque are reported in the literature.

U.S. Pat. No. 4,847,070, issued July 11, 1989, to Pyrz et al., discloses oral compositions which are effective

against calculus containing a chelating agent which is an acrylic acid polymer or copolymer or EDTA, a strontium ion source, a fluoride ion source, a pyrophosphate ion source, and a pharmaceutically acceptable carrier. The mass average molecular weight of the acrylic acid polymer or copolymer used is in the range of about 1,000 to about 1,200,000.

U.S. Pat. No. 4,816,245, issued Mar. 28, 1989, to Gaffar, discloses a method of inhibiting human dental plaque and gingivitis involving regular application to the oral cavity of an oral composition containing an effective plaque- and gingivitis-inhibiting amount of polyvinyl phosphonic acid, or salt thereof, having a number average molecular weight of about 4,000 to 9,100.

U.S. Pat. No. 4,775,525, issued Oct. 4, 1988, to Pera, discloses a dental treatment composition and method for reducing dental plaque. The disclosed method comprises treating dental surfaces with a composition containing sodium alginate, which acts as a calcium ion chelating agent which weakens the bond between the plaque and the teeth, thereby allowing easy removal of the plaque by subsequent brushing. The compositions disclosed in this patent may also contain benzalkonium chloride and zinc sulfate, which provide for desensitizing the teeth and eliminating halitosis.

U.S. Pat. No. 4,759,925, issued July 26, 1988, to Gaffar et al., discloses the use of a mixture of certain perfluoroalkyl surfactants and an alkali metal or ammonium cation as a dentifrice or a mouthwash to prevent plaque formation.

U.S. Pat. No. 4,627,977, issued Dec. 9, 1986, to Gaffar et al., discloses an oral composition containing a calculus-inhibiting amount of a linear molecularly dehydrated polyphosphate salt and, to inhibit enzymatic hydrolysis of said polyphosphate salt in saliva, a combination of a fluoride ion-providing source and a synthetic anionic linear polymeric polycarboxylate.

U.S. Pat. No. 4,528,179, issued July 9, 1985, to Gaffar, discloses a method of inhibiting human dental plaque and gingivitis by the regular application to the oral cavity of an oral composition containing an effective plaque- and gingivitis-inhibiting amount of polyvinyl phosphonic acid or salt thereof. The polyvinyl phosphonic acid of this reference has a preferred number average molecular weight of about 6,000 to about 100,000.

U.S. Pat. No. 4,428,930, issued Jan. 31, 1984, to Chang, discloses a dentifrice composition containing a water-dispersible, membrane-forming material which, when applied to tooth surfaces in an oral environment, attaches thereto and forms a substantially continuous hydrophobic barrier thereon, which hydrophobic barrier substantially reduces elution of a previously applied therapeutic agent. This patent also discloses a method for inhibiting plaque formation on teeth which comprises contacting the teeth with an effective amount of the above-described composition. Polymeric anionic membrane forming materials disclosed as useful in the compositions of this patent include a class of polymers having a polyolefinic main chain with acid functionalities pendent therefrom. Typical of the materials which can comprise the polyolefinic main chain are polymers of ethylene, propylene, styrene, unsaturated carboxylic acids, and copolymers of two or more of these materials. Representative polymeric anionic membrane forming materials disclosed as useful in the compositions of